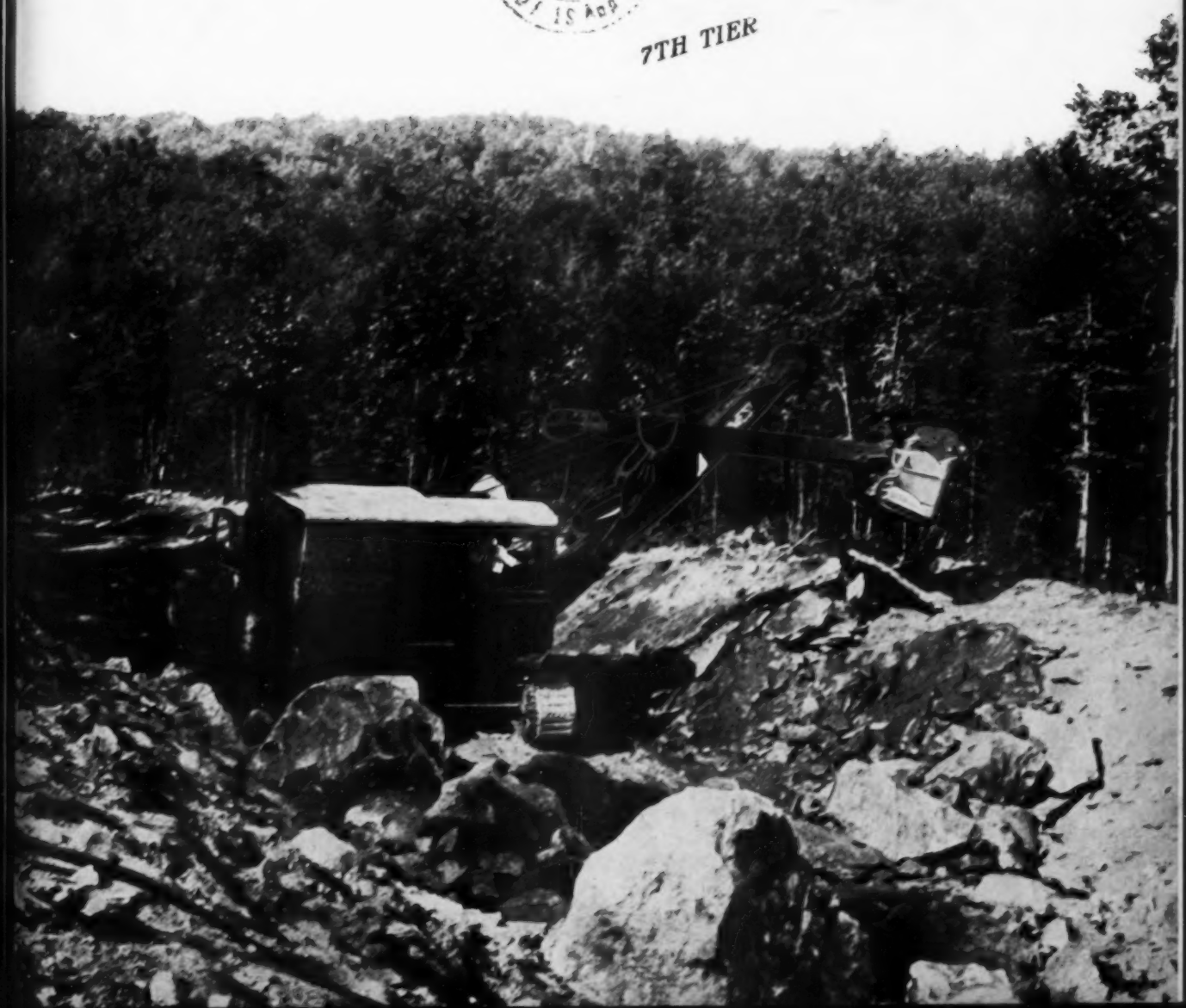
Heavy Rock Excavation
in
Central Connecticut
See page 29

7TH TIER



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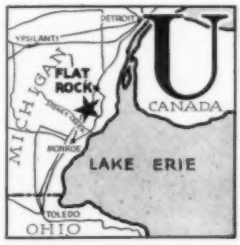
Paving from 4 A.M. to 7 P.M.

W. H. Knapp of Monroe, Mich., Used Three Complete Crews Each Day

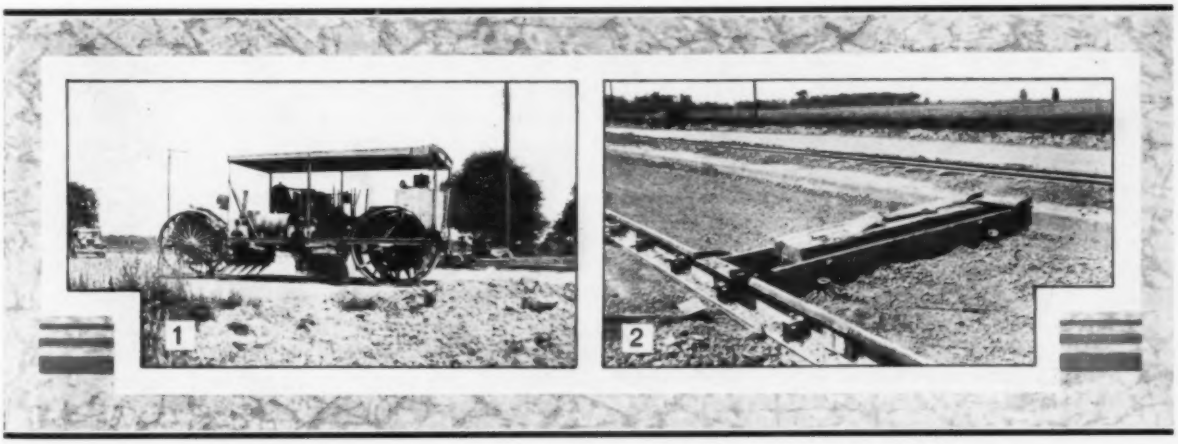


USING local labor chosen from men he knew personally, W. H. Knapp completed an interesting pavement widening project 8.5 miles long just north of Monroe, Mich., during the summer of 1933. The project on U. S. Route 24, the main highway between Detroit and Toledo, consisted of pouring two 10-foot widening strips, one on either side of the existing pavement, with 10-inch slabs. The work extended from Stony Creek on the south to Flat Rock, Mich., on the north. The rough grading was a separate contract, awarded to W. H. Knapp in March, 1932, and completed in September of the same year. Grading consisted chiefly in scarifying the old macadam and earth shoulders and then coring out with a grader so that the fine grade could be finished.

On the grading and scarifying the contractor used a local product known as the Oswald grader which performed the work very satisfactorily. It consists of a structural steel frame with a pair of traction engine wheels at the front with lugs to give a firm traction when scarifying, and is driven by a heavy-duty gas engine mounted in the center of the frame. Below there are a scarifier and a grader blade both actuated by bevel disc drives for moving them up or down or for swinging the blade. A group of levers at the right side of the machine control all operations and the operator can see all that is going on from his seat. At the rear the machine is carried on a pair of wide wheels that roll the grade, leaving it in good condition. Two runs over the grade to scarify and blade out the material leave it clear and rolled.

Form Setting and Fine Grade

The forms were set along one side of the new slab and the old slab was used for the other side. A foreman with a form setter and helper and two men trimming trench handled all of that portion of the job, setting the 10-inch Blaw-Knox forms well ahead of the paver. Five men on fine grade kept the grade very



GRADING METHODS ON A SOUTHERN MICHIGAN PAVING PROJECT

1. A locally-designed power grader of unusual appearance. 2. The grade or scraper board pulled between the forms by a team just ahead of final grading.

well in shape, leaving it a little high for the scraper or home-made subgrade planer which was pulled over the forms by a team. With the grade men were three handy men who were called upon to handle odd jobs from one end of the project to the other, but for convenience in time keeping they were carried on the grading gang. One of the handy men oiled the forms and carried the pins ahead for the form setters.

The scraper that was pulled over the forms consisted of two 2 x 8-inch planks cut to the proper cross-section and set about 2 feet apart. A shoe running on the forms held them to the proper depth and a pair of railroad ties weighted them sufficiently so that they picked up a lot of loose dirt where the grade was a little high. The material accumulated between the planks and was shoveled out by the grade men. Following this, the grade was rolled by a Galion 5-ton gas roller with a McCormick-Deering engine.

The title of this article and the comment on the time-keeping brings us to the hours of the labor on the job. There were three gangs, each of which worked five hours a day for six days a week. They started at 5 A. M. and worked until 9 A. M., then the second crew came on and worked until 2 P. M., and the third crew came on at 2 P. M. and worked until 7 P. M.

Batching for the Industrial Railway

The batches for this job were all hauled by an industrial railway that had as nearly a perfect grade as any contractor, in his dreams of a contractor's heaven, could wish. The rails were all laid on the old concrete pavement, which narrowed the traveled way a few feet and made it necessary to confine traffic to northbound vehicles. Southbound traffic was detoured around the job but there was ample opportunity for trucks and automobiles to get through with a minimum of delay to traffic and not much interference to the contractor as all his hauling was done by the industrial railway, except for a couple of utility trucks that went through with the regular traffic.

The batching plant was located at about the one-third point of the job and was used for one-half the paving. It was then moved to the middle of the project for the paving of the second half as the four trains and also the water line would not keep the job running without delays with a haul or delivery of more than 4 miles.

The first set-up of the batching plant was just off the grade. The track was carried over the drainage ditch at the side of the road on wood cribbing and then the line run around the back of the cement platform and the batcher and onto the main line again, which ran through the batching plant, on the loading side of the cement platform. The empty came in on the spur track and the locomotive uncoupled and left the train of 16 cars on the spur. The locomotive then ran down the main line, threw the switch and coupled to the loaded train that the yard locomotive had spotted at the cement platform for loading. If the train was completely loaded before any train of empties was in sight, the yard locomotive placed the train out of the way completely on a waiting spur.

The aggregates were delivered to the yard by the producer by truck and dumped on the three stockpiles of sand and two sizes of gravel. They were loaded into the Butler batching plant by a Koehring crane with a 40-foot boom and a Brownhoist 1-yard clamshell bucket. A strap iron grizzly over the sand bin prevented any rags from the sand cars getting into the batchers and clogging the flow. The batching plant crew for one shift consisted of the crane operator, one batch man, one man below tripping the batches as he spotted the cars, one man cleaning up in the yard and clearing the track where aggregate had been spilled, the yard locomotive engineer, and the foreman. Seven men, all colored boys, handled the loading of the seven bags of cement into the cement containers of the Lakewood batch boxes. The cement was hauled direct to the rear of the cement dock on flat bed trucks and unloaded direct to the batch boxes, if a train was in. Otherwise the cement was stacked in 7-bag piles ready for the next train. A storage shed at the end of the cement platform contained the high strength cement for the intersections, and also some extra cement to tide over a slow delivery from the freight yard. The aggregate was purchased delivered to the stockpile and the cement was furnished by the state. The individual batches averaged the following proportions by weight, 1,085 pounds of coarse stone, 1,102 pounds of fine stone, and 1,650 pounds of sand and 7 bags of cement.

Handling the Trains at the Paver

There were four trains on the road at all times and they were hauled by four 8-ton gasoline locomotives. There were three Whitcomb locomotives and one American locomotive. The yard locomotive was a 5-ton American unit. Five track men maintained the four miles of industrial track which had passing spurs every half mile. Two brakemen were employed per shift but they did not ride the same trains every time. They assisted all along the line, watched the operation of the locomotives and the condition of the track and reported direct to the superintendent.

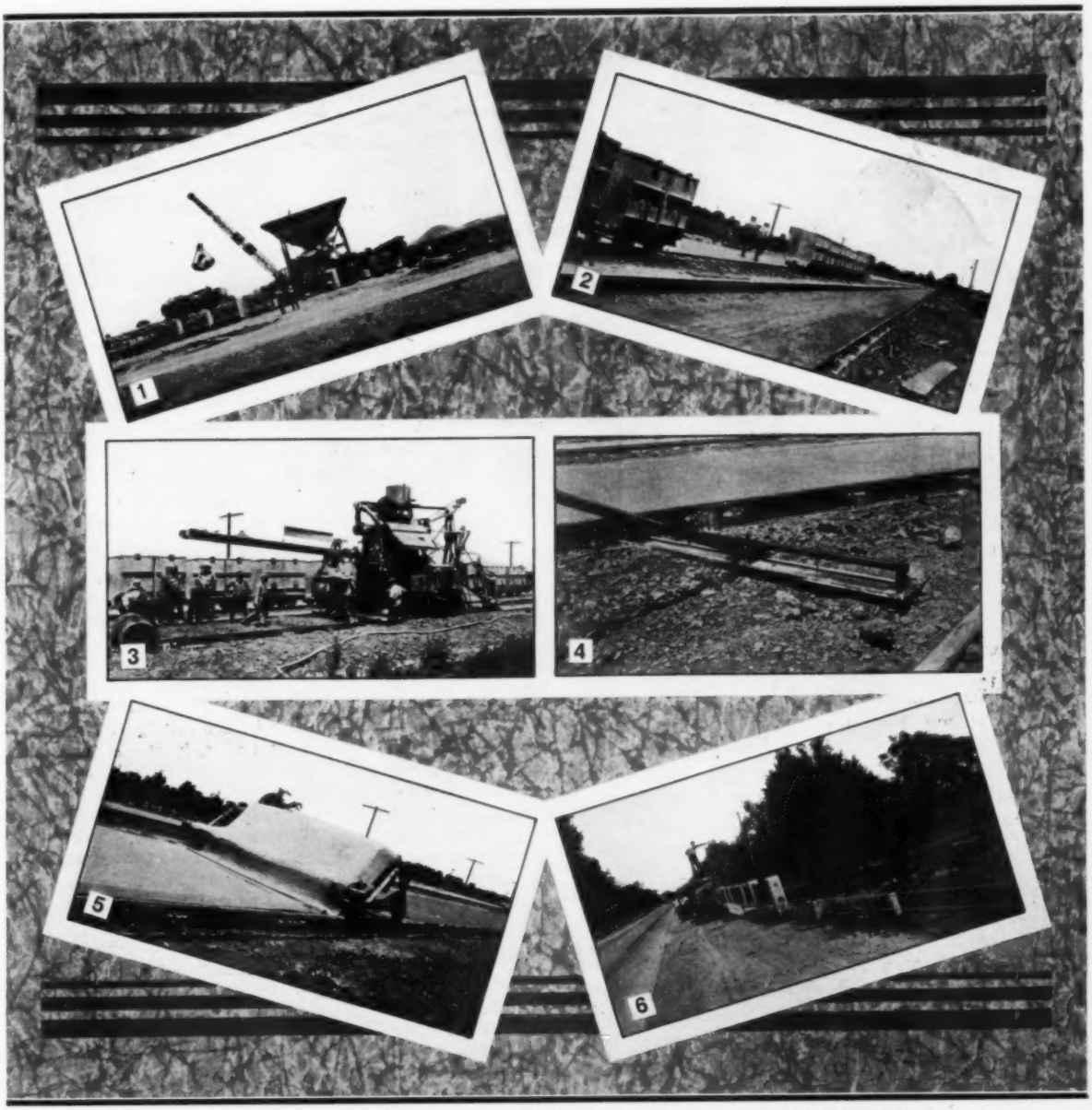
The handling of the trains at the paver was different from any that we have noted before and it operated remarkably well to provide a constant supply of batches at the paver throughout the day even when there were delays of considerable length at the batching plant or in hauling the trains. The first train out in the morning was an 8-car train with the locomotive at the head of the train. This was followed by a locomotive pushing a 16-car train which was unloaded immediately while the 8-car train waited on the track beyond the paver. When the 16-car train was unloaded and had pulled out, the 8-car train backed in and fed batches to the paver until the next 16-car train came up from the passing spur. This might mean that four, or even five or six, batches were used from the 8-car train. As soon as the 16-car train pulled in and an even number of batches had been used from the 8-car train, it pulled back and the brakeman uncoupled from the 16-car train a number of cars of full batch boxes equal to the number of cars that had been emptied during the period when there was no 16-car train at the paver. These full cars were coupled to the 8-car train which pulled back to the next spur where it shifted the empties and the full cars until the full cars were all next to the locomotive and the empties on the end. Then the train ran back and the empties were coupled to the 16-car train ready to go back to the batching

plant. Thus there was always a full 8-car train at the paver when an empty 16-car train pulled out. This organization delivered 600 batches to the grade regularly per 15-hour day.

POURING THE 10-FOOT SLAB

Where 20-foot slabs are the rule in the mid-west states contractors always find it somewhat of a novelty to be called upon to pour 10-foot widening strips. On this job the contractor poured first one widening strip for half the length of the job and then returned for the other, then the batching plant was moved and the remaining two strips were poured, working back to the plant first on one side and then on the other. There were two men dumping the batch boxes and one of them used a heavy wood mallet on each box to be sure that the sand did not stick in the box.

The Koehring paver which mixed the batches 60 seconds pulled a subgrader similar in construction to the one used by the fine grade crew. Two grade men shoveled out the accumulated dirt from the subgrade planer and also sprinkled the grade both ahead and behind the paver. There were three puddlers in the pit and two steel men placing the Truscon welded wire



CONCRETING AND CURING OPERATIONS ON THE W. H. KNAPP CONTRACT

1. The batching plant loading an industrial train of batch cars. 2. Splitting a train at the paver to speed up handling of the batches. 3. While there was usually plenty of action around the paver, on hot days the arrival of the water boy caused momentary halts. 4. An adjustable 6-foot float developed by one of the finishers. 5. The machine for spreading a continuous strip of burlap over the newly-finished slab. 6. Filling up the sprinkler wagons at a stream beyond the end of the contract. The spray bars from these wagons uniformly wet down the straw for curing.

mesh. Two men spaded the concrete against the forms and the old concrete pavement which acted as the form on the other side of the new slab. These men also shoveled to the strike-off of the Lakewood finishing machine as needed.

There were four finishers and no center joint men as are usually seen on Michigan jobs, but this being a 10-foot widening job there was no center joint. Two of the finishers edged the slab and two used 10-foot and 6-foot floats and 10-foot I & M reversible straight-edges. The finishers had developed an adjustable 6-foot float that they used most effectively and which did away with a great deal of the work ordinarily done with the 10-foot drag straight-edges. The float had a cross bar, as shown in the photograph, and from the bar a pair of threaded rods extended to the float with a pair of wing nuts on each so that the distance from the rod to the float could be adjusted and held with the pair of wing nuts. After the hand finishing was complete, the finishers dragged the slab with a 3-foot piece of burlap to give a uniform texture to the surface.

CURING

The burlap was applied in a novel manner. Usually one sees many piles of burlap along the slab ready to be applied. On this job the contractor had a 1,000-foot roll of burlap sufficiently wide to take care of the slab. He also had five pieces of burlap 100 feet long which were used the first thing in the morning. By using the five pieces from 4 A. M. on it was possible to pick them up at 4 P. M. and carry them forward. This left the 1,000-foot strip for use throughout most of the day. The men who picked up the burlap in the afternoon were assisted by two of the handy men from the grade crew as they were not needed for that work late in the day.

Two utility trucks were used to carry reinforcing steel, straw and burlap ahead. Four men stripped forms beginning at 4 P. M. but more usually at night. They used flat cars and a dinkey for hauling them ahead and spotting them along the grade for the use of the form setters the next day. They also banked the edge of the pavement with earth as they pulled the forms.

As soon as the concrete was clear of the burlap, it was spread with 3 inches, compacted measurement, of straw. This was done by five men who also sprinkled the straw assisted by two tank wagons which proved very satisfactory in giving uniform distribution of the water over the entire slab. One of the tank trucks carried a 1,000-gallon tank and the other a 600-gallon tank. Each was equipped with a sprinkler pipe which swung out over the slab for a distance of 10 feet and was drilled with 3/16-inch holes spaced 2½ inches along the bottom of the pipe. Two-inch pipe was used for the sprinkler arms. The previous year the contractor had a 20-foot job where he used these same trucks but he had to equip them with 10 feet of the 2½-inch pipe and on the end of that, 2-inch pipe for the remaining 10 feet as the smaller size for the entire length did not give sufficient water at the extreme end. The straw was sprinkled on this 1933 job for at least seven days. Then if the beam tests were satisfactory and showed a modulus of rupture of at least 550 pounds per square inch, the straw was removed.

Expansion joints of premoulded material 1-inch thick were set every 108 feet by the steel men and edged by the finishers.

WATER SUPPLY

A Barnes triplex pump and another of similar type were used at two locations on the job to pump water from creeks into the 2-inch line laid along the shoulder on the side opposite the industrial track. The taps for the paver hose were placed every 220 feet in the line and the paver carried 160 feet of 1½-inch hose.

A Goulds triplex pump was also installed at another creek and powered with an old Oakland engine and clutch mounted on a trailer body. It was used to supply water to the two tank trucks for sprinkling the straw.

PERSONNEL

Bids for the paving on this project were opened on October 26, 1932, but the contract was not awarded until November 21, 1932, because of right-of-way difficulties. Paving operations were started on May 24, 1933, and completed in 57 working days. The work was done under the personal direction of W. H. Knapp of Monroe, Mich., contractor for the project, with L. G. Christler as Superintendent. For the Michigan State Highway Department, C. K. Wallace was Project Engineer.

Reducing Motor Truck Accidents

MANY contractors operating large fleets of trucks have experienced difficulties with certain drivers who seemed to have accidents more frequently than others. A particularly valuable study has been made of accident-prone drivers and has recently been published under the auspices of the Committee on the Psychology of the Highway of the National Research Council.

Since 1927 a Middle West public utility has made a comprehensive study of traffic accidents occurring in its fleet of cars. During the first two years of study, it was found that bad weather and light conditions or matters of chance were not responsible for accidents, as had been previously assumed, but that accidents were more frequent under the good driving conditions, of June, July, August and September. It developed that there was a group of accident-prone employees who contributed the major portion of the accidents and it was found that the men driving the greatest number of miles were absent from the accident list.

In 1931, after the elimination of the worst drivers, the other accident-prone drivers were given special attention and instructions but their record did not improve. Five of the worst offenders were then examined by the Department of Psychology of the State University. Four were definitely subnormal and the fifth had telescopic vision. From the records of traffic accident occurrence for any driver, it was found that, after the third accident, the accident frequency could be accurately predicted, especially for the worst 10 per cent of drivers.

When the accident-prone drivers were put at other work, it was found that personal injury accidents took the place of traffic accidents, and that their accident frequency was even more constant than when driving.

The vehicles which most often required mechanical repairs were the ones used by the accident-prone drivers. These repairs were due not to accidents but to generally severe driving, which again was traceable to the driver. Of the 650 accidents analyzed, none could be traced to a defective condition of the vehicle. The vehicles were unquestionably better maintained than the average on the road. In very few cases did high speed appear as a cause of accident.

Widening a Levee

Material Dug from River by a Traveling Slackline Cableway Placed in Fill by Chutes

ANOTHER example of the use of equipment other than the obvious machine has been noted on a levee job along the Puyallup River in Washington. A job which would normally have been handled by a suction dredge was handled successfully and more economically by a traveling slackline cableway.

In the late summer of 1932, the State of Washington advertised for bids for making a fill along one bank of the Puyallup River for a distance of about 6 miles. An existing levee 30 feet wide was to be broadened to a width of 62 feet on top with a slope on the land side of 1½ to 1. The depth of this new fill would range from 0 to 10 feet and the total quantity to be placed was estimated at 360,000 cubic yards. The water side of the existing levee was paved with concrete on the slope, and it was specified that material for the fill could be excavated from the middle of the channel but must be deposited in the fill without damage to the concrete slopes. Excavation in the channel was limited to a depth of 6 feet.

Inasmuch as this work had been contemplated for some time, many of the Pacific Coast contractors were familiar with the conditions and were prepared to do some close figuring. The Hart Construction Co., of Tacoma, Wash., entered a bid based on using a Sauerman slackline cableway excavator operating from a self-supporting movable tower that would travel on the existing levee, and received the contract on its bid, in September 1932, by a comfortable margin. The company purchased a 2-yard Sauerman machine and constructed a self-supporting timber tower so arranged that the cableway bucket would dump into a bunker on the tower and the material would be distributed from the bunker to the fill by means of a hinged and counterweighted chute.

The average distance from the digging point to the dumping point was about 300 feet and on this length of haul the 2-cubic yard machine could be counted upon to handle around 2,000 cubic yards every 24 hours, which would make about 100 feet of fill on the normal sections of the dam. In actual practice, the machine exceeded this output on many days. According to a report in July, 1933, when the work was almost completed, there was some delay at the start in making adjustments and also due to the fact that there was some unsuitable material in the river, but for the period of March through June, 1933, the contractor averaged approximately 40,000 yards per month, having a low of 35,000 yards and a high of 50,000 per month. The machine averaged 96 yards per hour of actual digging time and 73 yards per hour of elapsed time from the start of the job. The rated minimum and maximum hourly capacities of this 2-yard machine from 78 and 104 cubic yards respectively.

To date, the machine has done better than a half-million yards. This figure includes the yardage it handled for its original owner who used it to produce concrete aggregate for a large dam in the State of Washington. Some of the early troubles with the machine were due to the quick wearing of the steel liners in the chutes, the ¼-inch steel liners lasting approximately 10,000 yards. Then a rubber liner ½-inch thick was installed and this material lasted about 80,000 yards in the upper chute and 150,000 yards in the lower chute.

The crew on the machine consisted of an operator, a shift foreman, a spout operator, and two laborers, with a master mechanic who was on duty during the daytime and subject to call in case of trouble at night. The contractor operated four 6-hour shifts, five days a week or 120 hours a week, starting at seven on Monday morning and shutting down at seven Saturday morning, using Saturday for necessary repairs and replacements. Operations were normally stopped for a few minutes at one o'clock each day to grease the traveler block, all other greasing being done while the machine was running or being moved.

(Continued on page 33)

The Self-Supporting Movable Tower Showing the 2-Yard Cableway Bucket Dumping into the Bunker and the Material Being Distributed by a Chute at the Left

The Lubrication *of* Shovels, Cranes and Draglines

The Fifth of a Series of Articles on an Important Phase of the Maintenance of Construction Equipment

SHOVELS, cranes and draglines operate under the same adverse conditions as tractors and the lubrication of these units determines their life of service to a considerable extent. The type of lubricant to be used on various parts, the quality of the lubricant and consistent application as required practically determines the upkeep and replacement costs, as well as the continued usefulness of the machine itself.

It has been stated by manufacturers that from 60 to 80 per cent of their service expense in the field may be traced to improper and inefficient lubrication. The importance of this subject is stressed by them through their engineering department, as well as being incorporated in their instruction books and other literature. A survey made on a large number of jobs shows that many operators are inclined to regard lubrication as an inconsequential matter in their operations, delaying its consideration until excessive repair and replacement costs bring it forcibly to their attention.

Equipment of this type frequently does pioneering on a job and forced delays in operation will retard the functioning of subsequent equipment and operations, when time is an important factor. We take the liberty of quoting from a letter received from a prominent manufacturer, which stresses this particular point:

"A shovel or dragline may more or less set the pace for the rest of the job. On many jobs a breakdown of a machine of this kind may tie up a plant that has a fixed operating expense, for days, for all of which you can see the importance of properly maintaining the equipment, so as to reduce 'time out' to a minimum.

"When our demonstrators go out on a job, they always stress the importance of lubrication to the men in charge of operations, including the operator, as we fully realize that proper lubrication at proper intervals and in proper quantities is very important to the life of any piece of mechanical equipment; and it does no good to lengthen out the intervals and use twice as much lubricant."

Diagrams and instructions issued by the manufacturer should be adhered to as closely as is consistent with operating conditions. Invariably these are compiled on the basis of extensive experimental work on the part of capable engineers in the field, where the mechanical equipment is operating under every conceivable condition, and they base their recommendations on practical and not theoretical experience.

Excavating machinery is built to withstand the severe duty it is required to perform. The best metals obtainable are used in bearing construction, and frames as well as other parts are rugged and powerful, built to withstand the strains imposed. The machines represent a large capital investment, which should be protected to the fullest possible extent, that their usefulness and productiveness may be prolonged for the maximum length of time. Proper and efficient lubrication of all moving parts is the greatest contributing factor to this accomplishment, involving comparatively small expense for the lubricants required and labor for application.

As stated in a previous article, it is a fallacy and error to believe all lubricants of a relative type are equally as efficient, and that their purchase should be based on price to obtain economical results. The range of values in oils and grease lubricants is probably greater than any other commodity used in contracting development work. It has been proved repeatedly that cheaper and inferior lubricants are by far the most expensive. It might be possible to obtain temporary results which would be satisfactory to the operator through the use of inferior products, but eventually their continued use would involve other expenditures which, combined with the original investment in such lubricants, would make the cost of the better grades sink into insignificance by comparison.

Preservation is the greatest underlying factor in overhead upkeep, and this may be obtained only through the use of properly selected lubricants. The slight difference in first cost should be disregarded and the efficiency of the lubricant should be the first and foremost consideration in making a selection. Invariably a cheap or inferior lubricant will last but one-quarter or one-third as long as better grades, thereby requiring

more frequent applications with the attending labor costs and the loss of service of the machine during lubrication. A well-known marketer of quality lubricants uses a very effective and true slogan, which might be applied to express more tersely the thought outlined, which is: "The sweetness of low prices never equals the bitterness of low quality."

Pressure Fittings on Excavating Machinery

Most excavating machinery have the greater portion of the bearings equipped with pressure fittings, replacing the grease cup wherever possible. This system has found favor through the fact that the possibility of dirt and other foreign substances getting into the grease lubricant is reduced to a minimum, and time saved in application of the lubricant itself is a factor contributing to the economy of operation. A lubricant of medium consistency is required for such pressure systems that it may be handled expeditiously through the medium of the dispensing equipment. As the density of the lubricant is lighter than that formerly used when grease cups were standard equipment, it is essential the oil used in the manufacture of such grease lubricants should be of higher viscosity to sustain the excessive loads imposed on the bearings.

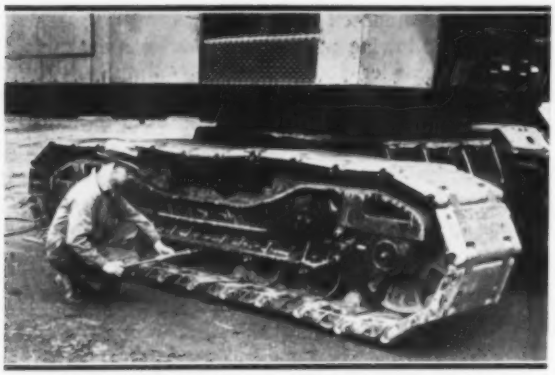
On the following page is the lubrication chart of a Link-Belt crawler shovel with 1934 lubricant recommendations, which is representative of machines of this type and shows various points of lubrication and types of lubricants, which may be applicable to other machines of similar construction. It sets forth the frequency with which the majority of the lubricants should be applied when the machine is in constant operation.

Care of Open Gears

The importance of selecting the proper lubricant for open gears cannot be emphasized too strongly. There is an inclination to believe that anything in the petroleum line which is black in color is satisfactory for that purpose, but gears require a lubricant which has lubricating properties, combined with sufficient adhesiveness to cause it to cling to the metallic surfaces when under pressure, and not be wiped off with the rubbing effect when the gears are in mesh and operating. The lubricant should be manufactured from a sufficiently heavy-bodied oil to withstand heavy loads without breaking down. The consistency of a gear compound

EXCAVATING EQUIPMENT STARTS OUT PROPERLY LUBRICATED—KEEP IT SO AND YOU WILL CUT DOWN LOST TIME AND REPAIR BILLS

1. *A Bucyrus-Erie 1½-yard shovel leaving the factory, ready for work and who knows what kind of treatment.* 2. *A Link-Belt dragline doing heavy duty on levee construction.* 3. *Keeping dirt moving on a grading job with a Northwest shovel.* 4. *A Marion shovel handling heavy dirt excavation in Southern Illinois.*



All Parts of the Crawler Mechanism of Modern Shovels Need the Same Care as the Crawlers of Tractors as Described in the April Issue

or grease should be such that the lubricant may be applied to the face of gears with a stiff brush or swab. As open gears on excavating machinery are exposed to the weather, the gear lubricant should be a water repellent and show no indication of emulsifying when mixed with water.

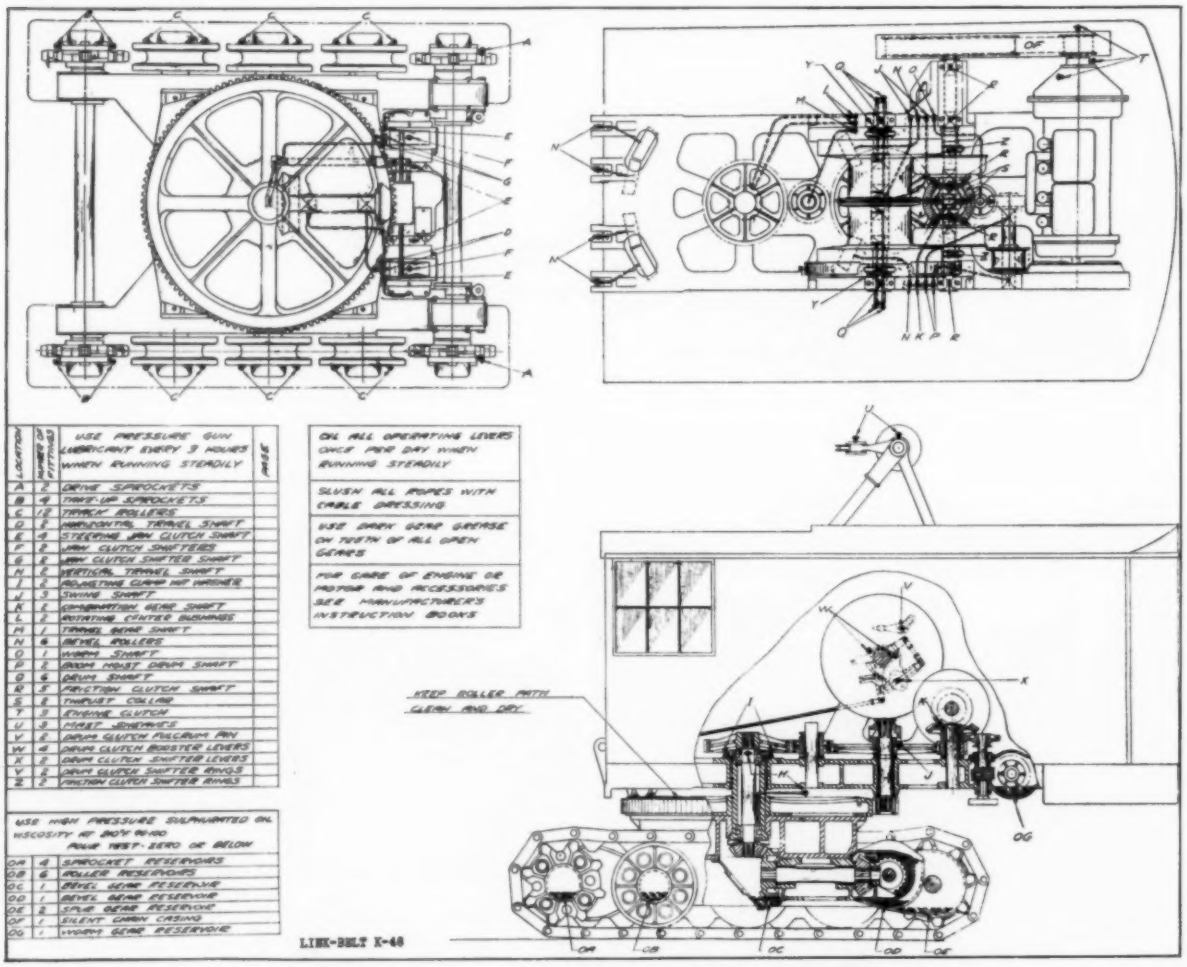
Frequently, "gear shields" are used on certain types of heavy-duty open gears and pinions, with a certain degree of success, but invariably they have to be heated to be properly applied, involving time and labor as well as special equipment for that purpose. This may result in the gears being more or less neglected as time might not permit applying the lubricant at the stated periods or as might be needed. Furthermore, during the cold seasons the lubricant may set or harden, causing it to become brittle and readily chipped off, leaving the face of the gears exposed to excessive wear and rapid deterioration. As the name implies, such a product is intended more as a shield than a lubricant, and as such it is not consistently dependable.

Graphite gear lubricants have found much favor for the lubrication of open gears operating under comparatively heavy loads. The graphite tends to prevent the grease being washed from the face of the gears, and gradually forms a coating between the points of contact which protects the gears from excessive wear. Such lubricants should not be "loaded" with an excess amount of graphite or their adhesive properties will be partially destroyed, permitting the grease to be thrown from the gears when in operation, causing excessive loss and a dirty condition.

THE CARE OF ENCLOSED GEARS

In recent years engineers have found through extensive experiments that Extreme-Pressure lubricants

(Continued on page 38)



The Lubrication Chart for a Link-Belt K-48 Convertible Shovel

Grading the Bristol-Waterbury Cut-Off

Joseph Battaglia & Sons, Inc., Faced Peculiar Soil Conditions on Connecticut Project

A MICA schist, which when disintegrated and mixed with the native clay produced after rain an excessively slippery grade similar to soapstone, slowed down the 2.12-mile grading project of Joseph Battaglia & Sons, Inc., of New Britain, Conn., on the Bristol-Wolcott Road, Connecticut State Route 119. During the first month of work it was necessary to shut down operations for at least a day after each rain storm. As the storms were practically continuous, progress on excavation was slow.

A Five-Months Project

Work was started at the south or Wolcott end, May 1, 1933, with a Northwest 1¼-yard shovel powered with a Twin City motor. This shovel loaded three to five motor trucks, depending upon the difficulty of the digging and the haul, which varied from 300 to 1,000 feet. As this contract called for considerable relocation of an existing highway, traffic had to be maintained at intersections. This also made it possible for the contractor to start a second shovel, a Bucyrus-Erie ⅞-yard steam shovel, with three to five trucks north of the gas shovel. A Keystone shovel equipped with a skimmer scoop was used for stripping and with a pull scoop for culvert excavation.

The total excavation called for in the contract was 66,000 yards and of this 20,000 cubic yards proved to be rock, although the original estimate was much lower. A Worthington portable compressor and a Sullivan compressor mounted on a Reo chassis were used to provide air for the jack hammers. A blacksmith shop located in the barn of a farm house along the right-of-way sharpened the 1-inch and ⅞-inch steel in maximum lengths of 14 feet. For blasting du Pont 60 per cent dynamite was used, shattering the rock sufficiently so that it was readily handled with the power shovel.

The maximum cut, of about 22,000 cubic yards, was near the center of the job where an unexpected rock cut, practically the entire rock excavation on the job, was met. This cut ran 26 feet maximum depth and 100 feet wide at the top. The 20-foot roadway was excavated to a sufficient width to give 7-foot shoulders

in the cut, the remainder having 5-foot shoulders on either side.

The contractor used two heavy-duty Mack trucks of his own for the hauling and hired locally from four to six other trucks as needed. An Austin grader was used on the rough grade to handle large stone, assisted by two or three hand laborers. One man took care of the dump.

DRAINAGE

Because of the character of the cuts which produced unexpected springs as soon as the ground was disturbed by blasting, the Resident Engineer ordered the installation of 3,218 feet of 6-inch vitrified tile drain covered with 32 inches of crushed stone along both sides of the cuts. All of this was installed by hand in accordance with the Federal Emergency regulations. A bituminous gutter was laid along the side of the roadway on all grades to prevent erosion of the shoulders.

The drainage on this project necessitated the installation of 2,080 feet of 30-inch reinforced concrete pipe. The trench for this was dug partly by hand and partly with the pull scoop where the soil was so rocky that hand labor could not manage the gravel and small boulders encountered. The small vitrified clay tile drain pipe laid through the cut was stocked at either end of the larger cut at intersections of the old and new right-of-way and moved along the job by wheelbarrows.

PENETRATION MACADAM TOP

Eight-inch penetration macadam top was laid on the rolled 12-inch gravel subbase in three layers. There was first a 5½-inch base course in two layers, then a sand binder spread and broomed by hand and then rolled with a 12-ton roller. On top of this, ¾-inch stone was spread to a depth of 2½ inches rolled and penetrated.

PERSONNEL

This 2.46-mile grading and penetration macadam road job, which was started May 1, 1933, and completed the middle of September, 1933, was awarded to Joseph Battaglia & Sons, Inc., New Britain, Conn. Joseph Battaglia personally directed the work on the job and his son, Harry Battaglia, acted as Superintendent. For the Connecticut State Highway Department, Martin W. Goodskey was Resident Engineer.

Expansion Joints Now Required in All Federal Aid Roads

THE U. S. Bureau of Public Roads in a memorandum dated March 3, 1934, addressed to its District Engineers, requires the installation of expansion joints and provision for crack control in concrete pavements as a means of adding to the expected life of the pavements as well as reducing maintenance costs and permitting such pavements to carry designed loads without progressive deterioration.

On all future concrete road projects on which Federal funds will be expended, expansion joints will be required at intervals not greater than 100 feet with the expansion openings not less than ¾-inch nor greater than 1 inch. Provision also must be made for load transfer across expansion joints, either by the use of dowel bars or other devices which will accomplish the same purpose. The dowel bar spacings are to be less than 18 inches in order to transmit a high percentage of load from one slab to the other. For ¾-inch dowel bars a spacing of 12 inches is recommended and the length need not exceed 24 inches.

The memorandum calls attention to the fact that dowel bars must be accurately held in place, perpendicular to the plane of the cross section of the pavement and treated to break bond, and provided with metal caps on one end to give sufficient air space for movement in the slab. Continuous sleeves covering one-half the length of the bars will not be permitted.

Provision must be made for crack control between expansion joints by the use of steel reinforcement, or suitably designed transverse contraction joints or planes of weakness so spaced that the distance between such contraction joints or expansion joints does not exceed 30 feet.

The memorandum states, "The principal objections to the use of expansion joints in the past have been the difficulty in securing smooth riding surfaces at the joints and the fact that the joint fillers available for use permitted the infiltration of inert material into the joint opening when the pavement contracted, which in course of time caused the joints to become inoperative for expansion purposes. These objections are no longer valid. The technique of construction practice has been developed to a point where pavements with joints are being constructed equally as smooth as those without joints and joint devices or joint fillers are now available which, if properly installed, may reasonably be expected to render the character of service desired.

"In order to prevent the infiltration of inert materials into openings provided in pavements for expansion purposes, it is essential that some form of adequately sealed joint be used, or that the joint filler be highly resilient. Poured joints of bituminous materials or preformed joint fillers which are permanently extruded as the pavement expands cannot be expected to give satisfactory service over long periods.

"Where transverse contraction joints or planes of weakness are properly spaced to control cracking, edge bars may be omitted. Provision must be made for load transfer across contraction joints or planes of weakness. The slabs must be free to move at such joints or planes of weakness. It is recommended, therefore, that smooth round dowels, 24 inches in length, and treated to destroy bond, be used across contraction joints or planes of weakness. The size and spacing of the dowels should be the same as would be required for expansion joints. Metal caps to provide air space are not necessary.

"Longitudinal joints dividing the pavement into traffic lanes not only eliminates practically all longitudinal cracking, but reduce curling action of the slab to such an extent that the possibility of cracks is lessened. In designing for long time service there is justification for requiring the use of longitudinal joints in concrete pavements.

"Present indications are that a type of joint which can be sealed on top and sides against the passage of surface water to the subgrade is particularly desirable for use in connection with pavements constructed on certain types of subgrade soils which change volume substantially with an increase in moisture."

Coming Articles

Among the outstanding articles scheduled for early publication in CONTRACTORS AND ENGINEERS MONTHLY *are the June lubrication article describing the kinds and methods of lubrication for grading equipment, a particularly timely subject at this season; a description of a new method of meeting the dust problem in rock drilling; the details of a heavy grading project in Connecticut, involving a large amount of rock excavation; an account of a cold-mix asphalt resurfacing job; some suggestions on levee construction from a well-known levee contractor; and a description of the use of welding in reconstructing a steel viaduct.*

Proper Tire Combinations *for* 1½-Ton Trucks

Increase in Use of Smaller Trucks Due to Adverse Legislation Increases the Tire Problem

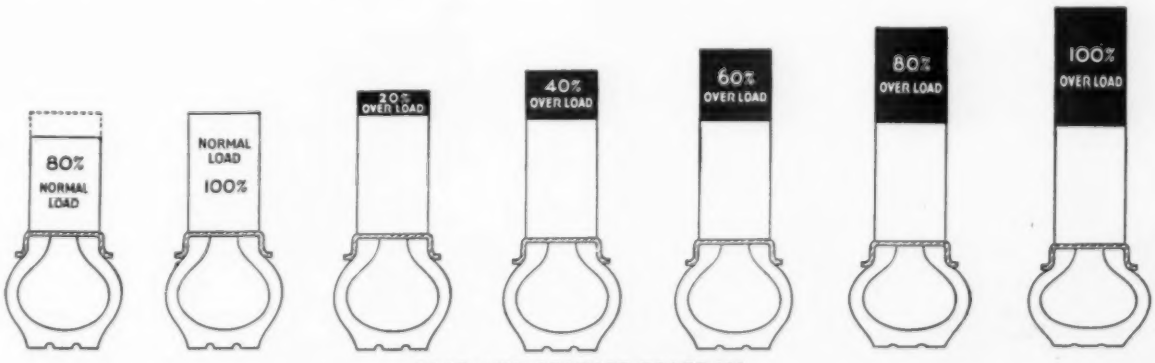
FOR certain classes of contracting the 1½-ton truck has always been very popular. With the coming of adverse legislation and rulings relating to heavier trucks in many states, trucks in the 1½-ton classification have been stepped up in performance and their field of service broadened until at the present time in the United States there are more trucks in this classification in operation than all others combined.

These trucks are operated in fleets of from one to several hundred. Since most of these trucks are made on a volume production basis, a large degree of standardization is necessary in their manufacture. When the trucks are actually put into service, however, they may be used for anything from very light utility hauling up to heavy-duty batch or rock hauling over long distances. When it comes to tire equipment, the size and type of tire which might be adequate or desirable for one type of service would be entirely unsuited for another. In the majority of cases the decision as to the size and type of tires to be used lies largely in the hands of the truck dealer and the user.

As the classification indicates, these trucks are designed and intended to use 1½ tons of pay load. Under actual working conditions, however, they are often called upon to carry much more than this amount. Since the tires must withstand all of the hazards of unusual operating conditions when the truck is called upon to carry a greater load than that for which it is designed, as well as to withstand other unusual and severe operating conditions, the tires are often the first part of the truck to fail as a result of these conditions.

It Is Good Economy to Start Right

Many operators of 1½-ton trucks have the erroneous idea that it is good economy to purchase the truck on standard equipment, so far as tires are concerned, and then if trouble develops to change over to whatever size is required to carry the load. For example, one user purchased a truck equipped with 6.00-20 tires on the front wheels and 6.00-20 dual tires on the rear wheels. The load which he was carrying was greater than the rated capacity of the truck and the tires were over-



LOAD AND SERVICE DIAGRAM

This diagram shows the effect of overloading on the ultimate service of a pneumatic tire. The total tire mileage is dependent also upon other operating conditions such as speed, road surfaces, braking, alignment, inflation and proper repairs.

A 1½-Ton Truck Equipped with Dual Rear Tires Mounted on 6-inch Rims and 9-inch Center-to-Center Dual Spacing Using 32 x 6 H.D., 34 x 7 T.T., or 6.50-20 Tires. Use Same Size Tires Front and Rear.

loaded to the extent that after 17,500 miles he had used five tires in addition to the original set and all of the tires on the truck at that time were worn out. Three of the original tires had been adjusted at $5.00 each or a total expenditure of $15.00. Two other tires had been purchased at $15.70 each or a total of $31.40. Five tubes were required for these tires at a total cost of $16.50. Thus the total expenditure for tires alone over and above the original set in the first 17,500 miles amounted to $62.90.

Analysis of the operating conditions revealed the fact that 32 x 6 truck-type pneumatic tires would have been adequate to carry the load, and could have been purchased as original equipment at an additional cost of $25.00. If these tires had been purchased with the truck, the saving over the first 17,500 miles would have been $37.90.

Another interesting fact was brought out in that the eleven tires required for 17,500 truck miles delivered an average of 9,545 miles each. Because of the overloaded condition of the tires, it was discovered that they had delivered only approximately 52 per cent of the service normally expected from a tire of adequate capacity.

How to Change Over Properly

It is obviously poor economy to replace tires which have failed on a 1½-ton truck, as the result of overload and other abusive conditions, with new tires of the same size and type when a simple check brings out the fact that the present tires are overloaded. A great many operators would be glad to change over to the proper size and type of tire if this could be readily determined. As a guide for choosing the proper tire and rim combination, the B. F. Goodrich Co. has developed a table which immediately shows the proper size of the tire to be used in carrying a given pay load.

The more popular 1½-ton trucks are made in two wheelbase lengths. The figures given for both the 131-inch and 157-inch wheelbase trucks represent average figures. There are various body types avilable for these trucks which carry different weights and thus allow for varying pay loads. For the purpose of this table, only average figures have been used. In using the table, if an extremely heavy body is used, the pay load as shown should be reduced somewhat. On the other hand, if a very light body is found, the available pay load can be increased somewhat.

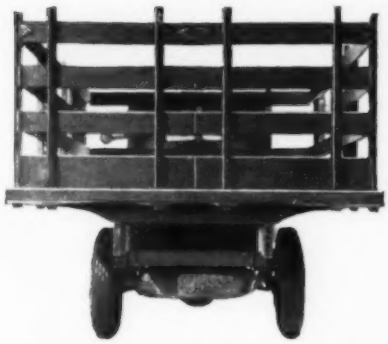
Overload and Underinflation Are Tire Enemies

It is impossible to compute all of the losses which result from tire abuse, but it is known that approximately 85 per cent of all tires presented to the manufacturer for adjustment fail as a result of either overload or underinflation. It is a known fact that tires which are habitually overloaded do not deliver as high mileage as those carrying their rated load, and it is further known that the amount of service to be expected from a tire that is overloaded decreases at a much more rapid rate than the increase in load. For example, a tire carrying its normal rated capacity load can be expected to deliver 100 per cent service. Another tire under the same operating conditions, but carrying a 20 per cent overload, may only be expected to deliver on the average 70 per cent of normal service. The relation between the load carried and the amount of service to be expected is graphically illustrated in the load and service diagram.

Users often make the statement that if manufacturers of 1½-ton trucks would apply the proper size tire as original equipment, a great deal of unnecessary tire trouble would be avoided. This is impossible, as most manufacturers of trucks in this classification offer a wide range of tire sizes and combinations as optional equipment. The wide assortment of tire options allows for practically any load which might normally be expected to be safely carried on a 1½-ton truck. A slight increase in the initial cost of the truck as a result of the specification of the proper size and type of tire brings surprisingly big returns in the increase in tire mileage and resultant lowering of the cost per mile of operation.

Even after a truck is in operation, the cost of a change over to the proper tire equipment is surprisingly low. For example, in the changeover guide, a great many of the tire combinations can be installed without the necessity of securing new rims and wheels. It

A 1½-Ton Truck with Dual Rear Tires with 7½-inch Center-to-Center Dual Spacing Using 30 x 5 T.T., 32 x 6 T.T., 30 x 5 H.D. or 6.00-20 Tires. Use Same Size Front and Rear.



A Single Tire Installation. Use Front and Rear Tires Same Size Wherever Practicable for Interchangeability, but Front Tires Should Never Be Larger Than Rear Tires

sometimes happens that the greatest obstacle from the operator's point of view is the cost of new wheels necessary to make the change over to the proper size of tire. At the present time it is possible to change from 5-inch to 6-inch rims on 1½-ton trucks for approximately $30.00 per truck. This includes the cost of the necessary wheels and rims, the extra charge for the larger tire size being in addition.

As a general rule the proper size of tire reduces the tire cost per mile of operation to a point where it is no longer a source of concern to the ordinary operator. Considering the present low cost of tires, it is impossible to overlook the savings which may be effected from the use of the proper size of tire on 1½-ton trucks.

CHANGEOVER GUIDE FOR 1½-TON TRUCKS

Payload Pounds	Tire Size*		Rim Size	Dual Spacing Inches
131-INCH WHEEL BASE				
1200	6.50-20	S	20 x 5	...
1700	7.00-20	S	20 x 6	...
	20x5 Standard rims are sometimes used but not recommended.			
1800	32 x 6 TTS		20 x5	...
2300	32 x 6	S	20 x 6	...
2500	8.25-18	S	18 x 7	...
3000	32 x 7	S	18 x 7	...
3400	6.00-20	D	20 x 5 D	7½
3700	9.00-18	S	18 x 7	...
4200	30 x 5 TTD		20 x 5 D	7½
4500	6.50-20	D	20 x 5 D†	7¾
4900	30 x 5	D	20 x 5 D	7½
5500	7.00-20	D	20 x 6 D‡x	9
5700	32 x 6 TTD		20 x 5 D	7½
6700	32 x 6	D	20 x 6 D‡x	9
7900	34 x 7 TTD		20 x 6 D‡x	9
157-INCH WHEEL BASE				
1100	32 x 6 TTS		20 x 5	...
1600	32 x 6	S	20 x 6	...
1800	8.25-18	S	18 x 7	...
2300	32 x 7	S	18 x 7	...
2800	6.00-20	D	20 x 5 D	7½
3000	9.00-18	S	18 x 7	...
3500	30 x 5 TTD		20 x 5 D	7½
3800	6.50-20	D	20 x 5 D†	7¾
4000	30 x 5	D	20 x 5 D	7½
4800	7.00-20	D	20 x 6 D‡	9
5000	32 x 6 TTD		20 x 5 D	7½
6000	32 x 6	D	20 x 6 D‡x	9
7200	34 x 7 TTD		20 x 6 D‡x	9

*S—Singles. D—Duals. †Use Budd No. 23597-S, Ford, Dodge; Motor Wheel No. 07467 Ford, Dodge; No. 07234 Chevrolet. Or 3¾" dish wheel with spacer. ‡Use Budd No. 31378, Ford; No. 31379, Chevrolet; No. 31378, Dodge. x This combination is not supplied as optional equipment by some manufacturers.

Widening a Levee

(Continued from page 25)

To move the machine a deadman was located every 1,300 feet. The tail hold for the track cable consisted of a series of two piles driven on the far bank of the river at about 300-foot intervals. The track cable was fastened to a toggle plate which was in turn connected to two sets of two sheave blocks with the standing line coming back across the river to a hoist on the machine. By taking up on the down-stream line and slacking off on the up-stream line, the track cable was shifted to correspond to the move of the machine, and by setting the dog on each drum the proper sag was maintained in the track cable. A third drum on this same hoist took care of moving down the road, through a set of three sheave blocks. A boom was used to pick up the skid timbers after the machine had moved over them and to swing them around in front. The machine was normally moved 20 feet at a time on four skids, the skids being 5 feet apart. Moving required about 5 minutes from the time digging was stopped until the machine was moved ahead, blocked and the lines adjusted.

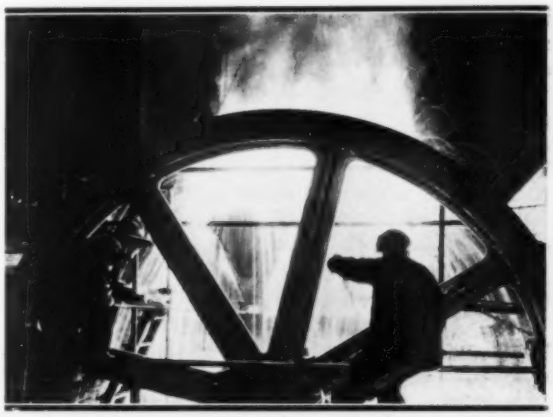
The auxiliary spout chute was installed to operate from the bunker and make a small fill on the water side of the machine, the regular spout not being quite long enough to reach that side of the machine.

Repair by Welding Again Saves Time

WHEN the main drive shaft at a power house of San Francisco's Market Street Railway Co. let go recently, three street car lines were completely tied up. The break occurred at 3.30 o'clock on Saturday afternoon. To obtain a new shaft and install it would have taken weeks and resulted in a complete shut-down during that time.

Welding was restorted to and a crew was recruited from the railway's track welding gang. Preparation for welding was under way by 5 P. M. and all Saturday night was consumed in preparing the fracture and assembling the welding equipment and materials. Preheating required until mid-afternoon on Sunday, when the Thermit weld was poured. By midnight the metal had cooled sufficiently to permit stripping off the molds and by 3 A. M. Monday the job was completed. A representative of the Metal & Thermit Corp., who was called in on the job, remained on the spot until it was completed.

The shaft which fractured is 18½ feet long. It has a large drive gear in the center and a cable drum at each end and one on each side of the drive gear. The break occurred at a shoulder of the drive gear seat and bearing where the diameters are 10½ and 13½ inches. The repair was made with the shaft in place. After the repair, the shaft was less than 1/32-inch out of alignment, less, in fact, than it had been before. The repair, of course, is a permanent one and the shaft is considered as strong and sound as a new one.



Welding a Broken Main Drive Shaft Averted a Complete Tie-Up in Street Railway Service in San Francisco

Legal Points for Contractors

These brief abstracts of court decisions in the contracting field may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt consult your own attorney

Edited by A. L. H. Street, Attorney-at-Law

When the Road Comes Over the Mountain

A Kentucky highway contractor built a road along a mountainside bordering a creek. Blasting caused rock to fall into the creek, obstructing it and resulting in an overflow of nearby land. The landowners sued the contractor, but lost the suit. Reasoned the Kentucky Court of Appeals (Combs v. Codell Construction Co., 52 S. W. 2d, 719):

"The appellants [the landowners] rely upon the authorities declaring that, where blasting operations result in a direct trespass by casting soil or rock upon another's premises, the responsible party must respond in damages, irrespective of the question of negligence. * * * That liability attaches to one engaged in road construction under contract with the highway commission where there is a direct invasion beyond the right-of-way, since that was not contemplated by the contract. * * * But where the material does not go beyond the right-of-way, the contractor is not liable for consequential damages to private property by reason of the road construction, since he is but the agent of a department of the commonwealth. * * *

"All the damage arose from obstructing the stream on the right-of-way in conformity with the specifications."

Materialman Exonerated from Damage Liability for Delayed Deliveries

"Please give us a check for the balance due for stone delivered on those state building jobs," requested a materialman of a general contractor.

"Nothing doing," replied the contractor. "On the contrary, we want you to pay us damages for your delays in delivering some of the stone. You'll recall that our contract provided that you would reimburse us what we should have to pay the state for a delay resulting from delays traceable to you. Under the contract with the state, we were to be liable for $50 per day for delays. We've got 78 days chalked up against you at $50 per."

"Owe you? Oh, yeah!" replied the materialman. "Take another look at that contract. It says that we must *reimburse* you against liability to the owner. You've settled with the State and it made no deduction for delay. That lets us out."

"Yes, but your delay involved loss to us in expense for maintaining our organization during the delay," rejoined the contractor.

"The contract does not cover that," came back the materialman. "It specifies that we are to reimburse you against liability to the State. That is the only consequence provided by the contract, so far as we are concerned in case of delay."

"Materialman is right," declared the Mississippi Supreme Court in the case of Garber v. Wright Cast Stone Co., 146 So. 449.

Compensation Act Held to Cover Employee Riding Home on Truck

If a contractor desires to safeguard himself against liability for injury to employees while using trucks as a means of coming to work or returning home, it is up to the contractor to make it perfectly clear to the employees that such use of the trucks is forbidden.

That is a legitimate inference from the opinion lately rendered by the New Jersey Supreme Court in the case of Guerise v. Decker & Canning Co., 159 Atl. 815.

The foreman of a crew engaged in road work on the outskirts of Elizabeth, N. J., directed the men, at the close of a rainy working day, to board a truck and go home. While riding the truck, the plaintiff, one of the men, fell off and was injured.

The court upheld the plaintiff's right to an award under the New Jersey Workmen's Compensation Act, despite the defendant employer's contention that the accident did not arise in the course of the plaintiff's employment, because use of the truck by the plaintiff in riding home was contrary to instructions that had been given the foreman by the employer and contrary to an understanding between the employer and the owner of the truck. The court ruled that any such limitations on the plaintiff's right to ride the truck were not binding upon him because not disclosed to him—that it was his right, if not duty, to obey the direction of his foreman to board the truck.

Road Contractor Loses on Two Items of Compensation Claim

"Speak now or forever hold your peace." The Law often exacts that a contractor speak up promptly if he intends to make a claim afterward that he has reason to suppose will be contested. His silence is apt to "sew" him up.

To illustrate, in the case of Connelly v. Road Improvement District No. 2, 43 S. W. 2d, 751, the Arkansas Supreme Court decided that a road contractor was not entitled to recover profits that he would have made, except for the fact that the public authorities changed the width of the road and diminished its length, because he started work without complaining against change of the specifications in those respects.

Another item of his claim that was disallowed was based on measurement of asphalt heated instead of cold, involving a difference of 6 per cent in volume. It was decided that this claim was inconsistent with his having assented to cold measurement until long after the job had been completed.

Care Required in Storing Materials and Equipment in Street

Every contractor who uses a street for temporary storage of building materials, etc., owes the general public, including children playing in the street, a duty to use care to avoid accidents. In laying down that rule in a recent case (Lamprecht v. Krueger, 46 S. W. 2d, 908), the St. Louis Court of Appeals follows what courts all over the land have frequently declared.

It will cost a St. Louis building contractor more than $3,000 because a mortar box piled against sacks of cement in a street fell over and injured a little girl playing in a pile of sand, unless some higher court reverses the decision reached by the Court of Appeals.

Replying to a contention made by the contractor's attorney, that the child was a trespasser, the court said: "The sand pile was not on private premises," but on "an open and public thoroughfare, ... a place where the plaintiff had a right to be, and the duty devolved upon defendant in the use of that street to so exercise his own right as not to cause injury to others."

The Editor Comments

Personal Observations and Reflections

A Step in the Right Direction

During the second week of April, Public Works Administrator Harold L. Ickes announced that $250,000 had been allotted by the Federal Emergency Administration of Public Works to the U. S. Bureau of Public Roads to cover the cost of supervising and inspecting road construction being done by states and counties with loans and grants from the Public Works Administration. These projects to be inspected and supervised by engineers of the U. S. Bureau of Public Roads are not part of the $400,000,000 road building program but are in addition to that program and are being built by the states and counties on their own initiative with loans and grants from the Public Works fund.

It is in the interest of efficiency and to prevent duplication of effort that the work of supervising and inspecting these projects has been transferred to the U. S. Bureau of Public Roads as this Bureau is well equipped to handle the work. It further enables the PWA construction division to give undivided attention to supervising other non-federal projects such as schools, sewers and sewage disposal plants, bridges, water works and projects of a similar nature.

The PWA Inspection Division will continue to handle the work of supervising and inspecting town and city street improvements.

Another Damper on Bid Peddling

Another very definite check on any tendency on the part of contractors to shop around among subcontractors after the opening of bids has been issued by Harry L. Ickes, Administrator, Federal Emergency Administration of Public Works. In an order issued April 9 to all Federal departments or construction agencies, Secretary Ickes states, "Every contractor who bids upon a project financed in whole or in part by loans or grants from the PWA shall submit in a sealed envelope with his bid to the contracting authority the names of all subcontractors and their bids upon which his bid is based. The sealed envelope so submitted shall have on it the name of the contractor with the words thereon 'Bids of Subcontractors'. Such submission shall be deemed to constitute an acceptance by the contractor, if awarded the contract, of the bid of each subcontractor. Any alteration therein, after the award of the contract, shall be subject to the approval of the contracting officer of the Federal Department or agency concerned."

The Contractors Code placed the first damper on bid peddling and now the largest source of construction contracts at the present time, the Federal Government, comes through with a "brass bound and copper riveted" regulation that places bid peddling in the class of things that just won't be done. This will work a hardship on the group of irresponsible contractors who delight in price cutting and playing off one subcontractor against another, but no honest thorough-going contractor who has a stake in the future will give anything but his heartiest approval to this new regulation.

"Mixed"

"When Marinette, Wis., CWA workers were laying the foundations of a new school building, they kept warm by moving their concrete mixer right into the cellar. Last week they had finished the cellar, leaving no exit for their mixer."

Thus reports our esteemed newshound contemporary, *Time*, the story of a job which was not done by a contractor. Ever since the day, many years ago, when we visited a friend and found him in the corner of the living room far from any possible exit, surrounded by a painted floor, we have rooted most heartily for contract jobs. *Time* has kindly added further evidence that amateur construction is liable to be more expensive in the long run.

Wages and Hours

The Committee representing the Durable Goods Industries has received reports from 2,672 individual companies showing that hourly wage rates in these industries are now practically back at their 1929 mark. It has discovered, however, that employment still remains 40 per cent below the level of 1929 and the time worked per employee is 30 per cent shorter. This situation very seriously affects the entire construction industry, which cannot absorb the cost of higher wages, meeting it out of past and present profits. There must be a very definite stimulation of capital goods industries, particularly construction, through judicious Federal appropriations for another year or two to insure recovery in these groups in which the major unemployment now exists. Within two years private capital and private initiative should insure sufficient private construction to bring employment back.

Theodore Reed Kendall

How the Other Fellow Did It

Ideas That Have Already Proved Helpful to Contractors

Hand Screeding Concrete Bridge Slabs

302. In the hand screeding of long as well as wide concrete bridge slabs, it is always difficult to push the concrete ahead of the screed and to move the screed slowly and steadily forward and at the same time to maintain a uniform finish. On one particular Missouri job, the contractor tried attaching a rope to the center of the screed and having two or three men pull steadily forward while the finishers worked the screed back and forth sideways. This proved unsatisfactory, due to the labor required and also due to the jerky, irregular movement of the screed. To remedy this, a small hand winch was secured and attached to an A frame about 30 inches high. With this anchored to an adjacent bent or to the abutment fill, one man was able to pull the screed forward slowly and steadily, regardless of the concrete piling in front of it, and the result compared favorably with the results usually secured on pavement by a mechanical finishing machine.

J. C. FOUNTAIN, Kirkwood, Mo.

A Steel Roadway for Trucks at the Cement Dock

303. Where cement docks are so located that a depressed roadway is necessary for the batch trucks, attention must be paid to maintaining the grade of the roadway and also keeping it dry, or at least stable, so that the trucks will not mire. One contractor took care of this by laying a set of steel plates 90 inches below the level of the cement dock and with a gradual grade on the drive-away side so that the trucks would be nearly level as they stopped at the dock. 25.2.32

Paying the Subcontractor for Batches Hauled

304. It is becoming increasingly current for a concrete paving contractor to sub the hauling of the dry batches to some local organization which has a fleet of satisfactory trucks. If the contractor and subcontractor agree upon a flat price per batch hauled, eliminating the element of distance, the question of payment is somewhat simplified. There is always the question, however, of the number of batches actually delivered to the paver. An Ohio contractor made this very definite by having the weigh man at the batching plant deliver a ticket to each truck driver as he left the batching plant showing the number of batches he was hauling. The man who dumped the trucks at the paver took the batch tickets from the drivers and deposited them immediately in a box on the paver. The drivers or subcontractor were paid on the basis of the tickets in the box at the end of each day. If any were lost it was the driver's fault and that batch or batches not paid for. 25.4.19

Kneelers Leveled by Turnbuckles Before Raising

305. A very helpful device and method for facilitating the handling and setting of 55-ton stone "kneelers" for one of the Triangular Group of Government buildings in Washington, D. C., was used by the contractor. Four turnbuckles attached to plugs in the top of the stone were attached by wire cables to the steel derrick hook. Before the block was actually raised from the ground it was carefully leveled by adjustment of the four turnbuckles so that when it reached the roof or cornice of the structure, many feet above, it was perfectly level and had only to be swung accurately into position. THR 2.3.34

Building Lip Curb

306. An Ohio contractor who was handling a widening project involving the construction of a considerable footage of lip curb used a slightly larger organization than is usual but the results in speed of building warranted it. The lip curb builder simply used a hand float and stacked up the concrete as it was deposited directly against the lip curb forms by two men bringing the concrete back in a steel container. The builder left the concrete 3 inches higher than the finished curb and not compacted. The lip curb "setter" used a 15-pound "mule" shaped to the final form of the curb and pounded the concrete down with it, compacting it and finally running the "mule" over the shaped concrete to float it. The "mule" had a guide made by bending the sheet metal over at the upper end so that it lapped over the concrete form for about 1 inch, giving a definite limit to the action of the steel float. 25.4.26

Setting Center Joints from Cantilevered Planks

307. On a Minnesota contract we saw a well conceived bridge which was designed for the use of the man who set the plates for the center joints. Instead of reaching under the rear cross planks of the trailer behind the finishing machine, as is done in so many cases, two planks were cantilevered from the rear cross planks so that the man worked in the clear. By having one plank on either side of the center, the man could face either way and thus avoid the annoyance of a stiff breeze blowing in his face or the sun in his eyes. Here is another example of thought given to details that makes the work easier, less of a burden and hence more satisfactory. 25.5.18

Paving Soft Grade with Steel Plates Helps Trucks

308. One Wisconsin contractor we know of always carries a stock of ⅜ x 24-inch steel plates in 10-foot lengths for use ahead of his paver to prevent the batch trucks cutting up the grade when it is soft. At one time when the grade was adjacent to the swamp, the plates were pushed down so that a ridge as high as the transmissions of the trucks showed all along the grade. The use of these plates hastens the time when the trucks can be put back to work after a rain and saves many valuable working hours. 25.6.32

BUILDING THE ROAD FOR NORRIS DAM

Boxley-Bray & Co., Contractor for the highway from Coal Creek, Tenn., to the site of Norris Dam, used a Cletrac 35 and Western bulldozer on the job. The 7-mile road required approximately 275,000 yards of dirt and 30,000 yards of rock excavation.

Construction Industry News

Association of Plate Guard Rail Manufacturers has recently been formed by manufacturers of guard rail, including General Wheelbarrow Co., Republic Steel Corp., Truscon Steel Co., and Tuthill Spring Co. R. M. Kyes is Secretary of the Association and its headquarters is located at 3140 E. 65th St., Cleveland, Ohio.

Novo Engine Co., Lansing, Mich., has announced the appointment of C. A. Robertson as factory representative in the Chicago territory, which includes the states of Minnesota, Wisconsin, North and South Dakota, Missouri, Iowa, Illinois, Nebraska, Kansas, Oklahoma, Texas and Arkansas. Mr. Robertson, who has been associated with the company for ten years, will operate directly from the plant at Lansing. The company, however, maintains a Chicago office at 3217 92nd Street.

Caterpillar Tractor Co., Peoria, Ill., held several territorial meetings during the past month and has five scheduled for May. These meetings from April 9 to May 21 are in Topeka, Kans.; Dallas, Texas; Memphis, Tenn.; Atlanta, Ga.; Roanoke, Va.; Harrisburg, Pa.; Albany, N. Y.; Fort Wayne, Ind.; Minneapolis, Minn.; Regina, Saskatchewan; Great Falls, Mont.; Denver, Colo.; and Lincoln, Nebr. The Caterpillar Twenty-Two, the latest addition to its tractor line, as well as the three diesel models are being featured at these meetings. The party making the trip include H. P. Mee, Vice-President in Charge of Sales; E. R. Galvin, Eastern Division Sales Manager; L. J. Fletcher, General Supervisor of Agricultural Sales; and L. B. Neumiller, Service Manager.

Robins Conveying Belt Co., 15 Park Row, New York City has announced the appointment of Fred Bathke, 1957 University Ave., St. Paul, Minn., to handle the sales of Robins products in Minnesota, the western part of Wisconsin and the northwestern section of Michigan, and of Raymond Church, Box 114, Pleasant Ridge Station, Cincinnati, Ohio, whose territory will include the southwestern part of Ohio, southeastern Indiana and western Kentucky.

Adnun Engineering & Manufacturing Co., Nunda, N. Y., has announced the appointment of Dave Kennedy as Midwest Sales Manager for both that company and the Foote Co., of Nunda. Mr. Kennedy has had considerable experience in the field of construction equipment.

Ingersoll-Rand Co., New York City has announced the appointment of Batt L. Spain as Manager of the Turbo-Blow Department, with headquarters at the general offices of the company, 11 Broadway, New York City. Mr. Spain has been Manager of Turbo-Blower Sales at the West Lynn Works of the General Electric Co. for the past 24 years. The turbo-blower business of General Electric Co. has recently been acquired by Ingersoll-Rand.

Stephens-Adamson Mfg. Co., Aurora, Ill., manufacturer of conveyors, has announced the re-opening of sales-engineering offices at Pittsburgh, Pa., and Huntington, W. Va. The Pittsburgh office is located at 1206 Gulf Building, and is under the supervision of Harry W. Banbury, who has long been associated with the firm as Purchasing Agent and Special Sales Engineer. The Huntington office will be in the charge of D. W. Allen, a tipple and conveyor expert with years of experience in the West Virginia district.

LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa, has announced that it has recently taken over the manufacture and sale of the rubber-tire replacement assemblies for the crawler equipment of dump wagons which were designed and formerly sold by the E. H. Anderson Equipment Co. of Chicago. These units will be known as Air-Lode Carriers and will be offered for sale through the regular LaPlant-Choate dealers throughout the United States.

Republic Steel Corp., Youngstown, Ohio, has announced the appointment of Ralph G. Caulley to the staff of the Detroit District Sales Office. Mr. Caulley has been connected with the Wheeling Steel Corp. for the past fourteen years, the last seven of which were spent in the Detroit district.

The Lubrication of Shovels, Cranes and Draglines

(*Continued from page 28*)

are admirably adapted for the lubrication of enclosed gears which are encased in oil-tight housings, as well as for other bearings where the lubricant may be retained without leakage. These are made from viscous oils, having a certain amount of sulphur, which is chemically combined. The sulphur content materially increases the pressure resistance of the oil and unquestionably maintains a lower frictional temperature, as for many years sulphur has been used in many petroleum products where a cooling agent has been required. Extreme care has to be exercised in the manufacture of lubricants of this type to prevent separation and precipitation of the sulphur content.

Various bodied oils are used for lubricants of this character depending upon the consistency which is required for the duty to be performed. The general recommendation for summer use is that which conforms to S.A.E. No. 160, which has a viscosity of 3,000 to 6,000 seconds at 100 degrees F. For lighter duty the S.A.E. No. 110 may be used as the viscosity range is from 1,500 seconds minimum to 3,000 seconds maximum at 100 degrees F. The cold test of the oil is not of as much consequence during the warmer months, but during the winter where low temperatures prevail, it is important that a low cold test oil be used in a lubricant of this character.

The extreme pressure type of lubricants are more expensive to manufacture, owing to the absolute necessity for the use of the better grades of raw material in their production and the care required in their manufacture. In cases where price may be a dominating factor, sodium base gear lubricants of a semi-fluid consistency may be used. While they do not have the pressure-resisting properties of the extreme pressure type of lubricant, a well-made lubricant of that character will withstand comparatively high temperatures without breaking down.

Wire rope is used extensively on cranes and draglines and its care and preservation is of major importance in the operation of these machines as well as for the protection of life and property. The care and lubrication of wire rope will be discussed in a later article.

Ask Your Tractor Dealer

Why It Pays to Use

D-A LUBRICANT
AND
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Specialized Lubrication
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Sold and Recommended by TRACTOR and EQUIPMENT DEALERS EVERYWHERE

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Home Office, Main Plant
INDIANAPOLIS, IND.

The New Universal Automatic Wagon Drill in Use on a Road Widening Job in Virginia and, with the Boom Vertical, Drilling 18-Foot Holes on a Railroad Underpass Project in Kentucky

An Automatic Wagon Drill

A NEW wagon drill which will drill holes in any direction and has automatic air feed has been announced by the Cleveland Rock Drill Co., 3734 E. 78th St., Cleveland, Ohio. When feeding into the rock, the mechanism automatically maintains the drilling machine in the correct position for fastest drilling. When reversing or when approaching the rock, the speed of feeding may be varied from a few inches to 25 feet or more per second. Little air is required for the feeding mechanism, the rate being not over 4 cubic feet per minute for ordinary rates of feed.

The air-feed cylinder serves as a boom or support for the guideways on which the slab-back mounted machine travels when being fed into or reversed away from the rock. The boom is mounted on an offset U-bar which can be fixed in any position around the center line of the wheel axle. This arrangement permits placing the machine in a wide variety of positions, heights and angles.

The drilling machine which has been designed for use with this wagon drill is provided with a special blower which is more powerful than usual. A slight pull on the blowing valve lever suddenly turns full pressure through a ¾-inch hole into the chuck chamber at the end of the shank, automatically short-stroking the hammer, and blowing any clogged or muddied hole clean.

New Features for Road Rollers

HYDRAULIC power steering control, especially developed and adapted to roller use, has recently been announced by the Hercules Co., Marion, Ohio, for use with its Hercules Model 100, 10-ton three-wheel roller. A cast steel steering arm is mounted directly on the squared top of the king post, connected to which is the hydraulic piston and cylinder. The latter is firmly anchored to the roller frame and mounted on a cast steel saddle. The steering control is located in the operator's cab, and the roller changes the direction of its course smoothly and easily with a slight touch on the steering control, thus eliminating operator fatigue.

Another new feature for use with Hercules rollers is the new Hercules hydraulic scarifier. This scarifier is so designed that the scarifier teeth may be stopped at any desired point in the vertical movement of the tooth bar.

A cast steel center rear roll is still another development for Hercules rollers. A cast steel spider forms the spokes in this two-piece wheel, while separate semi-steel rims of any desired width may be mounted thereon. This feature makes possible a wider scope of work done by the roller, such as earth fills, earth dams and similar projects requiring wider rollers. These wider rims may be attached in the field quickly and easily, thus making the roller available for any special work required.

Floodlights for Night Construction

IN construction work a floodlight must be more than a funnel. It must provide control so that the light is concentrated or distributed, whichever is required, over the area in which the work is being done. Curtis X-Ray floodlighting projectors, made by Curtis Lighting, Inc., 1120 W. Jackson Blvd., Chicago, Ill., are made in four types, giving the various kinds of light control needed.

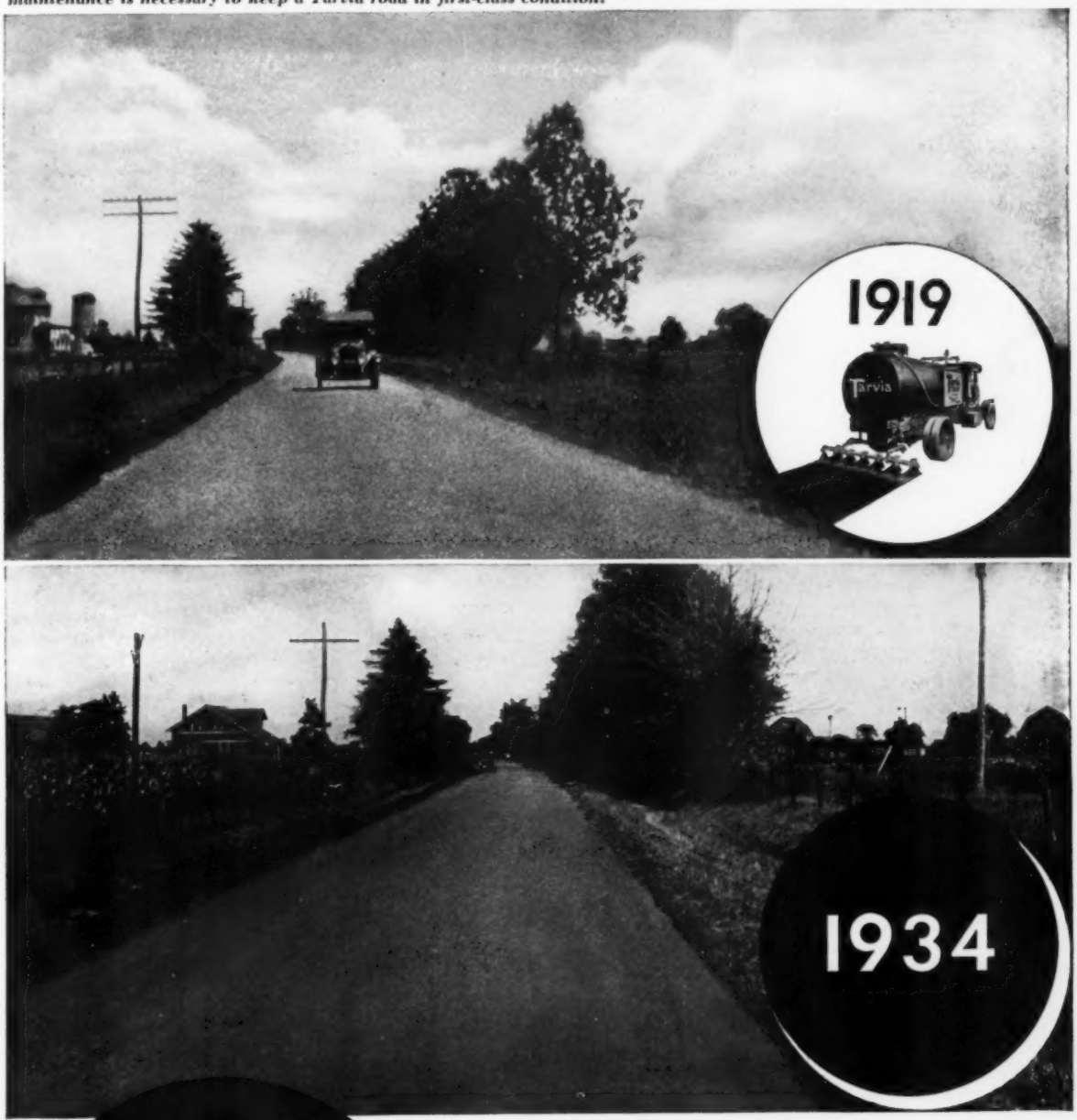
The concentrating units have their greatest use where light is confined to small areas or where light is projected from comparatively long distances. The distributing units are used for lighting small areas at close range, or large areas from relatively short distances. The rectangular beam units produce either horizontal or vertical bands of light by turning the rectangular beam cover glass in the hinged cover, the horizontal beam being suitable for lighting flat construction areas and the vertical beams for vertical construction areas. These four types of projectors are each made in four sizes. The smallest model, known as the Star, is a 200 or 250-watt light, the next, or Moon, 500 watts, the Sun Jr. light, 750 or 1,000 watts and the largest, the Sun, 1,500 watts.

Curtis X-Ray projectors are simple in design, rugged in construction and easily installed and adjusted. They are weatherproof and easy to relamp. The housing of each unit is of heavy-gage copper or steel. The heat-resisting cover glass in the door of each projector is held firm and tight against a cork gasket in the housing by latch bolts, making a water-tight joint between the cover and the body of the projector. All units are equipped with a universal swivel base. Adjustment in direction or spread of beam of light is very simple and change of focus of the lamp is made by turning a thumb screw on the outside of each unit.

All Curtis floodlights are equipped with X-Ray projectors which are regularly supplied with heat-resisting clear or rectangular beam cover glass of clearest quality, and processed with a pure silver reflecting surface, giving satisfactory floodlighting service, accurate light control and maximum efficiency.

Lighting Night Excavation

Stewart Road, Monroe County, Michigan, maintained with Tarvia since 1919, the year of the first successful transatlantic aeroplane flight. Top photo was taken in 1921; lower photo shows the same road today. Only the simplest, most inexpensive maintenance is necessary to keep a Tarvia road in first-class condition.



Barrett Tarvia GOOD ROADS AT LOW COST

TARVIA penetrates deeply into the road-bed and effectively binds the aggregate. This means that surface stone or gravel is held firmly in place, so as to provide a smooth, easy-riding, lastingly skid-safe road. With Tarvia, existing roads can be put in first-class shape—quickly, cheaply—and kept that way indefinitely. The Tarvia field man will gladly suggest simple, inexpensive repair and maintenance methods that will protect your investment in existing roads.

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Cementing a Sponge Rubber Expansion Joint to the End of the Hand Rail Before Pouring the Post

Sponge Rubber Expansion Joints

A SPECIALLY compounded sponge rubber, highly elastic and resistant to aging, has been developed by the B. F. Goodrich Rubber Co., Akron, Ohio, for use as an expansion joint material. When installed the material is placed under compression so that during contraction of the structural material at the joint due to low temperature, the sponge expands, approaching its original or normal state and then when the reverse condition takes place due to high temperatures, the sponge compresses or contracts as the members expand. The joint strip does not protrude because the cellular construction of the sponge rubber permits the compression to take place within itself, the action being similar to that of a bellows.

The Brook Park Viaduct over Rocky River over the Cleveland Airport, on Route 43, uses this new material as expansion joints for the hand rails. The sponge rubber ¼-inch thick is used in strips and special-shaped pieces were cut to conform to the face of the rail end next to the post. These were cemented into place. The post was then poured, the hydrostatic weight of the concrete and the pouring putting the sponge under compression sufficient to compensate for the expanding action necessary to maintain a tight joint under extreme contraction movement.

A New Crankcase Oil Filter

A FILTER which cleans oils drained from internal combustion engines in every type of fleet operation, removing non-lubricating elements from drainage oils, has been announced by Skinner Motors, Inc., 2231 Dalzelle St., Detroit, Mich. This Stream-line filter is said to clean crankcase oil for as little as 4 cents a gallon. Complete removal of all contaminants injurious to proper lubrication is accomplished by the filter upon the principle of edge filtration in which thousands of flexible discs 1⅝ inches in diameter, with holes in the center, are stacked in a column and the oil is forced by either pressure or vacuum to pass between and not through the flexible discs. As these flexible discs are compressed to a pressure of 80 pounds, they form a more or less solid pack. Thus when the oil passes between the discs, it is separated into almost molecular or vapor form and the impurities are collected at the edge and never penetrate within the pack proper. Because of this it is merely necessary to reverse the operation and the pack automatically frees and cleans itself of the material filtered out. This eliminates replacing of the filter pack but once a year, thus keeping the cost of operation low.

New Models of All-Wheel-Drive Trucks

TWO new gasoline-powered vehicles and five equipped with diesel engines have been announced by Marmon-Herrington Co., Inc., Indianapolis, Ind., extending its line of all-wheel-drive trucks. This line now consists of five series of all-wheel-drive trucks and truck-tractors with a total of 28 different models ranging in capacity from 1½ tons upward. Seventeen gasoline-powered Marmon-Herringtons now are available. The two new models in this division are the TH340-4, a four-wheel-drive unit with a capacity of 20 tons and the TH340-6, a six-wheel-drive vehicle with a capacity of 35 tons. Introduction of the five new diesel models bring this type of truck to the 5 and 6-ton fields.

New Heavier Double-Acting Pile Hammers

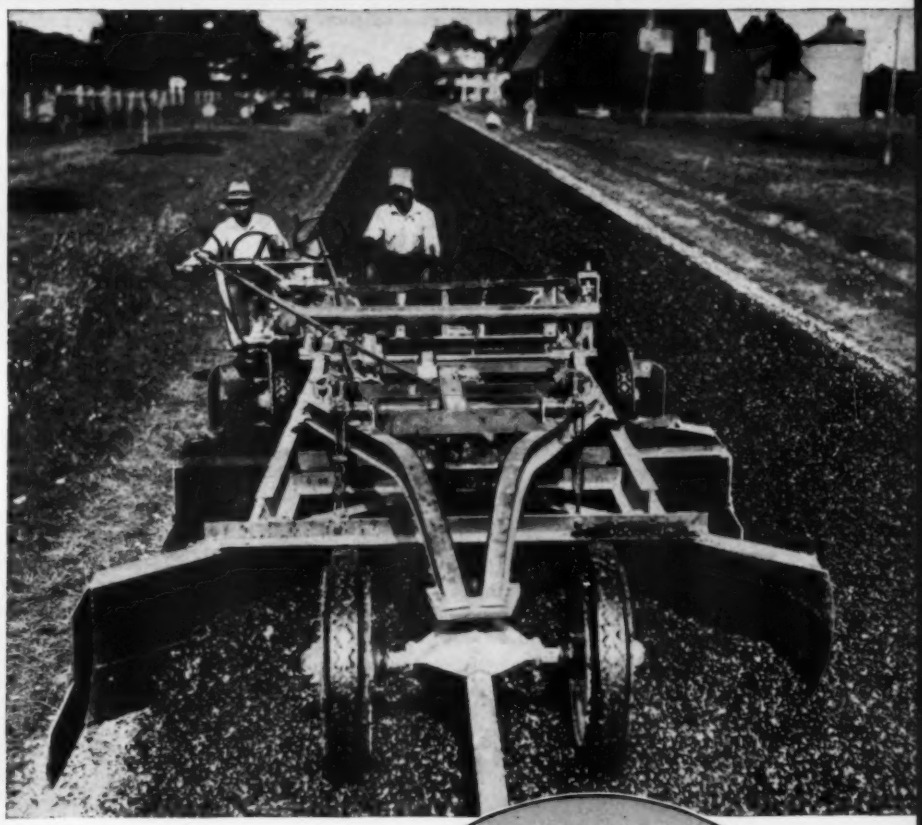
AFTER experimenting with three new models of larger sizes of double-acting pile hammers during the past two years, McKiernan-Terry Corp., 19 Park Row, New York City, has now placed Models 9-B-3, 10-B-3 and 11-B-3 on the market. There has been a marked trend toward the use of larger and heavier timber piles, concrete piles, steel pipe piles and steel cylinders for various types of foundations. This heavier piling makes advisable the use of these larger sizes of effective pile-driving equipment.

McKiernan-Terry Corp., has made structural improvements in its equipment as required by the changing conditions and has designed this new line of pile-hammers to supercede its B-2 type. One of the outstanding characteristics in the new B-3 type is the heavier weights of rams delivering blows at lower striking velocities, still maintaining one of the principal advantages of the double-acting hammer, namely, high frequency of blows. There have been structural improvements to meet severe service but these have been incorporated only after exhaustive field tests in actual driving.

The New McKiernan-Terry 11-B-3 Double-Action Hammer Driving Precast Concrete Piles from 30 to 60 Feet in Length

Mixes... Spreads... Finishes

MAKES BLACK-TOP ROADS SMOOTH AS A FLOOR



↑ *Above:* Mixing 3 inches of oiled gravel.
↑ *Right:* Mixing 2½ to 3 inches of crushed stone and cut-back asphalt.
↑ *Below:* Spreads to the proper width and depth.

ON your bituminous "road-mix" jobs why not get better results and at the same time save money by using a machine especially designed for this work?

Adams Retread Paver reduces mixing-time and mixing-costs because it mixes the aggregate three times in one passage of the machine—three times as fast as is possible with a single-blade machine. A better mix is obtained because it is accomplished while the bituminous material is in its most liquid state.

The same machine spreads the mixed material to exact width and cross-section desired, smooth as a floor and ready for rolling. Edges are straight and cleancut—hand work is practically eliminated. A much smoother, better-riding surface is obtained and at less cost than is possible with single blade machines.

Works equally well in crushed stone, slag, or gravel, and with tar, asphalt or road oils. Used and endorsed alike by highway engineers and contractors. Mail the coupon (at lower right) today for folder completely describing the work and advantages of this new and improved Adams machine.

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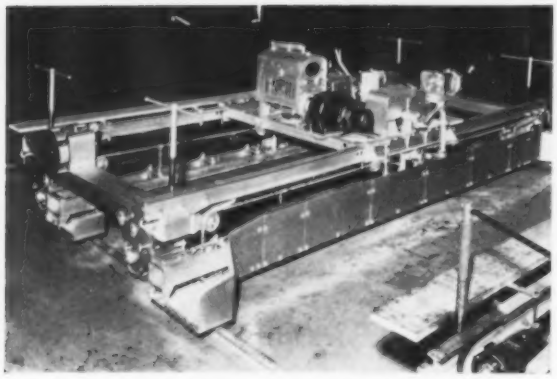


The New Blaw-Knox Gas-Electric Finishing Machine

A Gas-Electric Road Finisher

A ROAD finisher for concrete and bituminous paving which is fully-electrically powered, the power being furnished by a generator direct-connected to a gas engine mounted on the machine, has recently been announced by the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Pa. This electric drive permits greater ease of operation, the finger touch control making it possible for the operator to devote his attention to better finishing rather than to the mechanics of machine control.

This new Blaw-Knox finisher has four speeds forward and reverse. Traction is equal on all four wheels and maximum grades under a full load can be covered with ease. Other features of this new piece of equipment are the reduction in number of moving parts and the elimination of clutches, easy steering, automatic brakes which hold on all grades, electric connections for floodlighting for night work, with ample reserve power which can be used for operating tools if necessary, and vibrating attachments, tampers and accessories for bituminous paving may be added if desired.

A Smaller Series of Heavy-Duty Four-Cylinder Engines

THE ZX series of heavy-duty engines and power units, recently announced by the Hercules Motors Corp., Canton, Ohio, increases its line of engines, giving a complete range of sizes from 4 to 200 horsepower. The two new models, ZXA and ZXB, have a 2½-inch bore and 3-inch stroke, and a 2⅝-inch bore and 3-inch stroke respectively, with displacements of 58.8 and 64.9 cubic inches. The models are identical in general design and the majority of parts are interchangeable, the only difference being in the bore sizes and the parts affected thereby. The maximum torque of the ZXA is 37 pounds developed at from 1,500 to 2,400 rpm, and on the ZXB, 40 pounds developed from 1,500 to 2,400 rpm. Both models peak at 4,000 rpm, the ZXA developing 22 hp, and the ZXB, 24½ hp at this speed.

To meet present-day operating conditions calling for sustained high speed, special consideration has been given to valve cooling. Standard design includes thermosyphon cooling, but water pumps are available if specified. The engines and power units are equipped with a No. 6 standard S. A. E. bell housing. Either down-draft or up-draft manifolds are optional. Lubrication is of the full-force feed type to the main bearings and connecting rod bearings. The pump is located beneath the center main bearing and driven from the camshaft by spiral gears. The shafts and gears of the oil pump are case-hardened.

The ZX series engines have the crankcase cast integral with the block. The crankshaft is 2 inches in diameter at the three main bearings. The pistons normally are of cast iron and carry three rings above the pin. The lower of these rings is of the oil-regulating type. The piston rings are of case-hardened steel, each pin being securely locked in its connecting rod by a clamp bolt, and operating in two hard case bronze bushings in the piston. Aluminum pistons can be supplied. The camshaft is on the right hand side, supported by four bearings. The engines have L-head cylinders and the valves are 30 degrees seat.

This series of engines are for application where small engines are required, offering a heavy-duty four-cylinder engine with provisions for all accessories and with the customary in-built Hercules characteristics. The engines are available in the open type and completely-enclosed type power units and can be equipped to operate on kerosene and natural gas as well as gasoline. Different types of power take-offs, including stub shafts, clutch power take-offs and reduction gears are available.

A New Wagon Drill for Quarry Work

FOR facilitating the drilling of deep drill holes in quarries and general rock excavation, the Worthington Pump & Machinery Corp., Harrison, N. J., has announced an improved-type wagon drill. The new machine incorporates an adjustable drill steel centralizer to reduce the time and labor necessary in collaring the drill holes. A leveling device permits the adjustment of the drill tower to the vertical position when the rig is set on uneven ground, thus eliminating the blocking up of the wheels. The drilling engine can be readily demounted from its detachable feed slide and the slab-back guide by the removal of two bolts, in no way disturbing the slab back. The machine can be furnished with either an air hoist or a hand winch for raising or lowering the drilling engine and either a hand winch or block and fall for handling the drill steel.

While the standard type is built with three wheels, it can also be furnished with four, for running on transverse track. The three or four-wheeled machine is constructed to be converted to the skid type if desired. The drilling engine can be furnished for either light or heavy, wet or dry drilling.

The New Worthington Wagon Drill

Select ASPHALT for PAVING with this knowledge . . .

TWENTY years ago the Standard Oil Company of Indiana marketed emulsified asphalt for use in building roads and pavements.

Our constant effort to develop useful grades and types of asphalts resulted in our producing cut-back asphalt cement. This cut-back asphalt has now been developed to a stage beyond all expectations and has proved its worth as a liquid asphalt cement over all other products of a like nature.

We still are prepared to supply on request, emulsified asphalt, but recommend Stanolind Cut-Back Asphalt as more suitable for improved road construction, as it has proved itself on thousands of miles of roads under all conditions. It has become one of the most extensively used liquid asphalt road materials and is recognized by highway officials as a useful material for many purposes.

These charts illustrate the difference in footage of pavement which could be constructed with the same number of gallons of Petroleum Asphalt Cement, Natural Asphalt, Stanolind Cut-Back Asphalt, Emulsified Asphalt.

There's a direct relationship between BITUMEN CONTENT and ROAD MILES

A. Stanolind Cut-Back Asphalt contains 65 to 80% by weight of bitumin and 20 to 35% of petroleum diluent.

B. Emulsified asphalt contains 50 to 75% by weight of bitumen and 25 to 50% of water emulsifying agents and preservatives to prevent freezing.

C. Natural asphalt contains from 55 to 60% by weight of bitumen and 40 to 45% of mineral matter.

D. Petroleum Asphalt cement contains at least 99% by weight of pure bitumen.

STANDARD OIL COMPANY
910 S. MICHIGAN AVE. (Indiana) CHICAGO, ILL.

Asphalt for every Purpose

THIS COMPARES THE PAVING AREAS OF VARIOUS TYPES OF ASPHALT

A CP-117 Demolition Tool

A New Demolition Tool

A NEW demolition tool, known as CP-117 and supplementing the CP-116, has recently been announced by the Chicago Pneumatic Tool Co., 6 East 44th St., New York City. This machine is particularly recommended for use in hard, dense concrete or similar medium to extremely hard material. It is valve-actuated and strikes a rapid, powerful blow. It is easy to hold, having no back-kick, and does not require riding.

The net weight of this tool is 75 pounds, its overall length, with retainer, is 28 inches, with a standard shank of 1⅛ x 6 inches with a 1¼ x 6-inch shank optional, and a ¾-inch air hose.

A New Economical Tractor

THE triple economy of low first cost, operation on inexpensive fuels and the power savings of track-type traction are among the features of the new Twenty-Two tractor announced by Caterpillar Tractor Co., Peoria, Ill. This model is powered with a 4-cylinder, 4-cycle, valve-in-head engine developed especially for converting a wide range of low-volatility fuels into efficient tractor performance. The engine has a 4-inch bore and 5-inch stroke and develops a maximum of 23.69 hp at the drawbar and 28.39 hp on the belt at a governed speed of 1,250 rpm. Lubrication is force feed to all main, connecting rod and rocker arm bearings. A twin fuel tank holds 20 gallons of tractor fuel and 2 gallons of gasoline, which is used in starting, and a 3-way fuel control valve is located on the dash in easy reach of the operator.

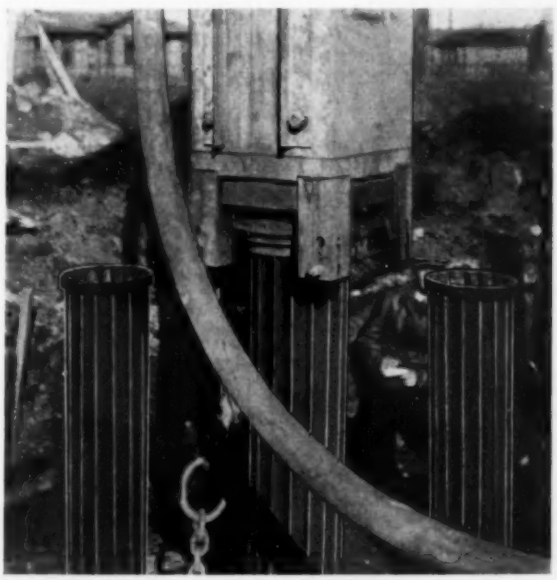
The fuel and cooling systems, manifolds and cylinder head have all been designed to give uniform, high operating efficiency in handling low cost fuels. The carburetor is located directly beneath the heated manifold jacket and a heat exchange valve is provided to insure thorough vaporization of the fuel before it enters the cylinder. Water circulation is controlled with a thermostat and a radiator by-pass allows the engine to warm up rapidly. The new Eisemann magneto with which the tractor is equipped is of the stationary winding inductor type, which requires no lubrication and is also said to be simpler and more accessible.

A New Line of Steel Piles

FLUTED steel poles for street lighting standards have been known favorably in the municipal field for many years. This line of fluted steel products is now being used as shells for cast-in-place concrete piles. The poles or piles, depending upon their ultimate use, are formed from steel plate, of various thicknesses from 11 to 3-gage or heavier, into continuously tapered tubes, by the Union Metal Mfg. Co., Canton, Ohio. The longitudinal seam is then welded by the electronic tornado process, using automatic shielded-arc welding equipment manufactured by the Lincoln Electric Co., Cleveland, Ohio. The tubes are then cold rolled and fluted and the rough ends cut off. The longitudinal weld is practically invisible. For piling, a pointed steel nose is arc welded to the driving end and a steel collar welded to the butt end. The arc-welded construction makes the shells essentially one-piece and absolutely water-tight.

The use of fluted tapered tubular construction provides the maximum strength per pound of steel, according to the manufacturer, and adds rigidity as it provides approximately 12 per cent more surface area for bearing than does pipe or a plain round tapered tube. The casings are driven in lengths up to 80 feet or more. When the length is over 40 feet, two sections are welded together to form one casing. This new piling is usually driven without the aid of a core or mandrel so that the steel must withstand not only the blows of the hammer but the lateral forces in the ground due to back pressure and to the driving of other piles in close proximity. Test piles recently were driven with a 5,000-pound hammer to a final resistance of 4½ to 5 blows to the inch. As high as 800 blows were necessary to drive the piling to a depth of 45 feet 6 inches.

Forty-foot fluted steel test piles used at the site of the Third Street Bridge, Hamilton, Ohio, were driven with blows up to 52 per foot through gravel-filled clay and boulders. These were 7 and 11-gage piles and when inspected showed no damage or distortion of the shell. Eleven-gage fluted steel piling shells manufactured by this company were used in the foundation of the new municipal incinerator at Cleveland, Ohio. A total of 506 piles 60 feet in length and 200 piles 50 feet in length were driven on this project.



Arc Welded Pile Casings Withstand Tremendous Blows from the Pile Hammer without Damage to the Welds

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